REMARKS/ARGUMENTS

Favorable reconsideration of this application, in view of the present amendment and in light of the following discussion, is respectfully requested.

Claims 1-10 and 12-18 are pending. In the present amendment, Claim 14 is currently amended. Support for the present amendment can be found in the original specification, for example, at page 13, lines 3-15. Thus, it is respectfully submitted that no new matter is added.

In the outstanding Office Action, Claim 14 was rejected under 35 U.S.C. § 112, second paragraph; Claims 1, 2, 4, 12, 15, and 18 were rejected under 35 U.S.C. § 103(a) as unpatentable over Ryusuke et al. (Japanese Patent Publication No. 05-009740, hereinafter "Ryusuke") in view of Grosshart (U.S. Patent No. 5,948,283), Kobayashi et al. (U.S. Patent No. 5,470,451, hereinafter "Kobayashi"), Kim (U.S. Patent No. 5,983,998), and Nguyen (U.S. Publication No. 2002/0011216); Claim 5 was rejected under 35 U.S.C. § 103(a) as unpatentable over Ryusuke in view of Grosshart, Kobayashi, Kim, and Nguyen, and further in view of Otsuki (U.S. Publication No. 2001/0003271); Claim 3 was rejected under 35 U.S.C. § 103(a) as unpatentable over Ryusuke in view of Grosshart, Kobayashi, Kim, and Nguyen, and further in view of Kazama et al. (U.S. Patent No. 5,567,267, hereinafter "Kazama"); Claims 16 and 17 were rejected under 35 U.S.C. § 103(a) as unpatentable over Ryusuke in view of Grosshart, Kobayashi, Kim, and Nguyen, and further in view of Burger et al. (U.S. Patent No. 4,143,523, hereinafter "Burger"); Claim 13 was rejected under 35 U.S.C. § 103(a) as unpatentable over Ryusuke in view of Grosshart, Kobayashi, Kim, and Nguyen, further in view of Byrd (U.S. Patent No. 3,537,515); and Claim 14 was rejected under 35 U.S.C. § 103(a) as unpatentable over Ryusuke in view of Grosshart, Kobayashi, Kim, Nguyen, and Byrd, and further in view of Mundlinger et al. (U.S. Patent No. 5,453,641, hereinafter "Mundlinger").

Initially, Applicants would like to thank Examiner Chen for the courtesy of an interview granted to Applicants' representative on April 30, 2008, at which time the outstanding issues in this case were discussed. Arguments similar to the ones developed hereinafter were presented during the interview.

This amendment is submitted in accordance with 37 C.F.R. §1.116 which after final rejection permits entering of amendments canceling claims, complying with any requirement of form expressly set forth in a previous Office Action, or presenting rejected claims in better form for consideration on appeal. The present amendment amends Claim 14 to comply with the requirements of form expressed in section 1 on page 2 of the Office Action dated January 22, 2008. Therefore, this amendment only includes subject matter which was earlier presented. Thus, no new matter has been added, and this amendment does not raise new issues requiring further consideration and/or search. It is therefore respectfully requested that the present amendment be entered under 37 C.F.R. §1.116.

In response to the rejection of Claim 14 under 35 U.S.C. § 112, second paragraph, it is noted that Claim 14 is hereby amended to depend on Claim 13. Thus, it is respectfully requested that this rejection of Claim 14 be withdrawn.

In response to the rejections under 35 U.S.C. § 103(a), Applicants respectfully request reconsideration of these rejections and traverse these rejections, as discussed below.

Claim 1 recites:

> A substrate processing apparatus comprising:
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> a processing chamber for accommodating a substrate therein;
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> a mounting table for mounting the substrate thereon;
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> a heating member disposed in the mounting table, for heating the substrate;
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> a sealing member disposed between a bottom of a support of the mounting table and a bottom portion of the processing chamber; and

> a cooling unit, having a cooling medium, for cooling the sealing member by using a latent heat of vaporization of the cooling medium included therein, wherein the cooling unit includes an airtight casing for accommodating the cooling medium therein, the casing has a first end portion and a second end portion, and the first end portion is configured to be inserted into an opening formed through the bottom portion of the processing chamber,
>
> wherein the cooling unit further includes a condenser accommodating therein the second end portion to thereby liquefy, in the second end portion, the cooling medium vaporized in the first end portion.

The substrate processing apparatus recited in amended claim 1 includes a sealing member disposed between a bottom of a support of a mounting table and a bottom portion of a processing chamber. The substrate processing apparatus also includes a cooling unit. The cooling unit has a cooling medium for cooling the sealing member by using a latent heat of vaporization of the cooling medium included therein. Specifically, in order to use a latent heat of vaporization of the cooling medium, the cooling unit includes an airtight casing for accommodating the cooling medium therein. The casing has a first and a second end portion, and the first end portion is inserted into an opening formed through the bottom portion of the processing chamber. The cooling unit further includes a condenser which accommodates therein the second end portion.

In this configuration, the liquefied cooling medium accommodated in the first end portion is vaporized by absorbing heat around the sealing member. The vaporized cooling medium is then transferred to the second end portion and is cooled down by the condenser, thereby being liquefied again. Then, the liquefied cooling medium is again transferred to the first end portion. By repetition of this cycle, even though the film forming apparatus is miniaturized and thus, the distance between the susceptor and the chamber is shortened, the sealing member is cooled so that a rise in temperature of the sealing member is suppressed.

Further, the cooling unit recited in Claim 1, which carries out a cooling operation by using latent heat of vaporization, can provide a much higher cooling power than that of the

water cooled jacket which performs a cooling operation by way of circulating a cooling medium. Moreover, when the water cooled jacket is used, air bubbles may be generated in a tube as water therein vaporizes, resulting in expansion of the tube. In contrast, in the cooling unit recited in Claim 1, expansion of the airtight casing can be avoided even with the vaporization of the cooling medium taking place at the first end portion because the cooling medium is liquefied at the second end portion. It is respectfully submitted that the cited references do not disclose or suggest every feature recited in amended Claim 1.

Ryusuke describes a heating apparatus including a top face of a case 14 which is covered by a flange 15 having a water cooled jacket 16 formed therein.[1] As described above, the water cooled jacket 16 described in Ryusuke performs a cooling operation by way of circulating a cooling medium, and ***not*** by using latent heat of vaporization.

The Office Action concedes on page 4 that Ryusuke does not teach the cooling unit recited in amended Claim 1. Instead, the Office Action relies on Grosshart and Kim as describing the claimed cooling unit.

Grosshart describes a temperature control system 26 to maintain a process temperature at a constant steady-state value during treatment of substrates.[2] Additionally, Grosshart describes that the temperature control system 26 includes an electrode 16 a heat exchanger 70 and conduits 85, 90 and 120 to allow water to flow therebetween.[3]

The Office Action takes the position that Grosshart "teaches the use of refrigeration sources for achieving steady-state thermal environment." Further, the Office Action uses this supposed teaching of Grosshart to suggest a motivation to combine Kim with Grosshart.

However, Grosshart describes that "the substrate support includes a fluid that circulates at a constant rate through the support"[4] and "[w]ater leaving the electrode 16 passes

[1] See Ryusuke, at paragraph [0005] and in Figure 8.
[2] See Grosshart, at column 5, lines 55-62.
[3] See Grosshart, at column 6, lines 15-35 and in Figure 3.
[4] See Grosshart, at column 2, lines 8-9.

through the conduit 85 and enters the heat exchanger 70, which adjusts the temperature of the water entering conduit 90 to a constant value."[5] Thus, similarly to Ryusuke, Grosshart only describes the use of a cooling unit which performs a cooling operation by way of circulating a cooling medium having a steady state in a plasma processing apparatus.

Accordingly, Grosshart does not disclose or suggest using latent heat of vaporization in a plasma processing apparatus. Therefore, as discussed during the interview, a person of ordinary skill in the art reading Grosshart would not be motivated to combine the evaporator of the ordinary air conditioner described in Kim to form the claimed cooling unit. Instead, as discussed in Grosshart, water leaves the electrode 16 such that water is not vaporized in a first end portion of the cooling unit.

Nguyen recites that "[c]ooling gas or cooling water enters through the entrance 14, pass the cooling tube 16 surrounding the heater 8, then returns to tube 17 and exists 15."[6] Therefore, the cooling unit described in Nguyen performs a cooling operation by way of circulating a cooling medium. Thus, Nguyen does not cure the above-noted deficiencies of Ryusuke, Grosshart, and Kim.

Additionally, it is noted that Kobayashi is silent with respect to cooling of a sealing member. Thus, it is respectfully submitted that Kobayashi does not cure the above-noted deficiencies of Ryusuke, Grosshart, Kim, and Nguyen.

Therefore, it is respectfully submitted that a *prima facie* case of obviousness has not been made with respect to independent Claim 1. Accordingly, it is respectfully requested that the rejection of Claim 1, and all claims dependent thereon, as unpatentable over Ryusuke in view of Grosshart, Kobayashi, Kim, and Nguyen be withdrawn.

Turning now to the remaining rejections in the Office Action, Applicants respectfully submit that none of the remaining secondary references (Otsuki, Kazama, Burger, Byrd, and

[5] See Grosshart, at column 6, lines 18-21.
[6] See Nguyen, at paragraph [0005].

Mundlinger) cure the deficiencies noted above with respect to the combination of Ryusuke, Grosshart, Kim, Kobayashi, and Nguyen. Therefore, for at least the reasons discussed above, it is respectfully submitted that Claim 1, and all claims dependent thereon, patentably define over all of the cited references. Thus, it is respectfully requested that the outstanding rejections of Claims 1-5 and 12-18 be withdrawn.

Consequently, in view of the present amendment, no further issues are believed to be outstanding in the present application, and the present application is believed to be in condition for formal allowance. A Notice of Allowance is earnestly solicited.

Respectfully submitted,

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